UNITED STATES MARINE CORPS
Logistics Operations School
Marine Corps Combat Service Support Schools
Training Command
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LVSM 7301

STUDENT OUTLINE

MAINTAIN THE MK17 ELECTRICAL SYSTEM

LEARNING OBJECTIVES

1. Terminal Learning Objective: Given an LVS, TM 2320-20/12A, tools, and equipment, perform second echelon maintenance on LVS electrical system, per the reference. (3521.13.12)

2. Enabling Learning Objectives:

a. Given an MK48/17, TM 2320-20/12A, tools, and equipment, inspect the MK17 electrical system for serviceability, per the reference. (3521.13.12f)

b. Given an MK48/17, TM 2320-20/12A, tools, and equipment, test the MK17 electrical system, per the reference. (3521.13.12g)

c. Given TM 2320-20/12A and partial statements pertaining to the MK17 electrical system, complete the partial statements to describe the procedures used to diagnose a malfunctioning MK17 electrical system, per the reference. (3521.13.12h)

d. Given an MK48/17, TM 2320-20/12A, tools, and equipment, repair the MK17 electrical system, per the reference. (3521.13.12i)

e. Given an MK48/17, TM 2320-20/12A, tools, and equipment, replace components of the MK17 electrical system, per the reference. (3521.13.12j)

1. IDENTIFICATION, LOCATION, AND FUNCTION OF THE COMPONENTS EMPLOYED IN THE MK17 CRANE ELECTRICAL SYSTEM

a. Junction Box

(1) The junction box is located on the right slewing cylinder (rotational cylinder) and receives its power from the MK48 electrical system.

(2) The junction box is the center for all of the crane electrical operations. Two circuit breakers, a relay, and two terminal blocks are located in the junction box.

(a) Circuit breaker No. 1. This 20 amp circuit breaker protects the actuator box assembly from overloads and provides power to the main power/remote switch.

(b) Circuit breaker No. 2. This 6 amp circuit breaker protects the capacity alert system from overloads and receives its power from circuit breaker No. 1.

(c) Relay. The relay provides circuit changes within the capacity alert system when required, and receives its power from circuit breaker No. 2 through terminal block No. 1.

(d) Terminal block No. 1. Terminal block No. 1 is the connecting point for providing power to the relay and proximity switch (BLACK/GREEN).

(e) Terminal block No. 2. Terminal block No. 2 is the connecting point for all ground wires (WHITE).

b. Main Power/Remote Switch

(1) The main power/remote switch is located under the actuator box assembly, directly above the control levers.

(2) It is the master power switch for the manual and remote control system.

(a) The "MANUAL" position will activate the solenoid dump valve that allows oil to flow to the main control valves. Thus, the control levers on the MK17 can be operated.

(b) The "REMOTE" position allows the use of the remote control unit.

(c) In the "OFF" position, electrical power to either the manual or remote position is no longer applied, and the crane control functions cannot operate unless an electrical failure occurs. This will be explained in more detail later on in this lesson.

c. Remote Control System

(1) The remote control system consists of a hand held controller, a 40 foot electrical cable or umbilical cord, a test plug, and an actuator box assembly. This system is inoperative without electricity.

(2) All components of the remote system, including the remote control unit, cable, and test plug, are located in a storage compartment above the control levers. The actuator assembly is a separate unit.

(a) Remote control unit

1 The remote control unit has four control switches (levers) that are used to signal the actuator box to operate all functions of the crane only.

2 There are also two deadman switches that activate the basic solenoid dump valve when using the crane during remote operations. Only one deadman switch need be depressed to activate the dump valve.

(b) Umbilical cord. This cord links the remote control unit to the actuator box.

(c) Test plug

1 The test plug is located inside the remote storage compartment and is stored in a holder when not in use.

2 The test plug is used to reset (neutralize) or bypass remote functions of the actuator assembly.

(d) Actuator box assembly

1 The actuator box is located directly above the control levers, mounted on a holding bracket.

2 The actuator box is the brain/drive motor/gear assembly that operates the main controls during remote control operations. The actuator rods link the drive modules to the main control valve levers.

d. Solenoid Dump Valve

(1) The solenoid dump valve is an electrically operated valve that directs oil through the main control valves.

(2) The main power/remote switch activates the solenoid incorporated in the valve, which shifts a spool that directs oil through the main control valves.

(3) During remote operation, the deadman switches on the remote control unit activate the solenoid. If the solenoid dump valve is not activated, hydraulic oil will flow back to the reservoir.

(4) The solenoid dump valve is located at the rear of the main control panel.

e. Electrical Failure Valve

(1) The electrical failure valve is located behind the main control valve panel, mounted directly in line with the solenoid dump valve. Incorporated on the electrical failure valve is a neutral switch, which provides power to the manual/off/remote switch.

(2) The electrical failure valve serves the same purpose as the solenoid dump valve. It directs oil through the main control valves.

(3) During an electrical failure, if the solenoid dump valve is inoperative, the electrical failure valve will allow for manual crane operation. When pulled to the "CLOSED" position, it will allow the oil to bypass the solenoid dump valve and flow directly to the main control valves. It will also open the neutral switch and will not allow power to go to the manual/off/remote switch.

(4) The electrical failure valve manually overrides the electrical portion of the crane. It will allow the operator to finish the crane operation until the electrical circuit can be repaired.

f. Capacity Alert System. The capacity alert system protects the crane from overloading by stopping all functions that increase the reach of the crane. Since increasing the reach of the crane results in increased stress on the crane, only functions that decrease its reach can continue. This enables the operator to continue working without damaging the crane.

(1) The capacity alert system consists of the following hydraulic components:

(a) capacity alert sensor valve,

(b) accumulator, and

(c) needle valve.

(2) The capacity alert system consists of the following electrical components:

(a) Capacity alert dump valve.

1 The capacity alert dump valve is located at the base of the crane. It diverts hydraulic oil flow away from functions that extend the reach of the crane.

2 An electrical solenoid, controlled by the proximity switch, helps determine which functions should receive pressure.

(b) Proximity switch

1 The proximity switch consists of a pendulum and magnetic switch, which are housed within a metal cover located on the folding boom.

2 The proximity switch determines when the folding boom is above the horizontal position. If the folding boom is above the horizontal position, the proximity switch prevents lowering. It works in conjunction with the capacity alert dump valve through to the relay located inside the junction box.

(c) These components will only activate under a loaded situation that exceeds the rated load capacity of the crane.

2. PRINCIPLES OF OPERATION RELATIVE TO THE MK17 CRANE ELECTRICAL SYSTEM

a. Power Flow From the MK48 to the Junction Box on the MK17

(1) With the ignition switch turned to the "ON" position, power from wire 640 of the ignition switch accessory (ACC) circuit flows to circuit breaker No. 11.

(2) From circuit breaker No. 11, power goes to circuit breaker No. 12 through a bus bar, and on to wire 844.

(3) Wire 844 will continue the power flow through multi-connectors 6, 18, and 20.

(4) From multi-connector 20, wire 844 goes directly to the input side of circuit breaker No. 1 located in the junction box.

b. Power from the Junction Box to the Crane Electrical Components

(1) Since the input side of circuit breaker No. 1 has power at this point, the BLACK wire on the output side will now send power to the neutral switch on the electrical failure valve.

(2) As long as the electrical failure valve remains in the "OPEN" position, power will continue from the neutral switch through the BROWN wire, and on up to the manual/off/remote switch.

(3) With power supplied to the switch, we can now operate the crane in two electrical modes, manual or remote.

(a) Manual position

1 When the main power/remote switch is turned to the manual position, power from the switch completes the circuit at the solenoid dump valve.

2 Upon activation of the solenoid, oil will now flow from the dump valve on to the main control valves.

3 Now, manual control of the crane functions can be operated.

(b) Remote position

1 When the main power/remote switch is turned to the "REMOTE" position, power to the solenoid dump valve is supplied from either one of the deadman switches on the remote control unit which activates the solenoid dump valve.

2 By depressing the deadman switch, the circuit to the solenoid dump valve is completed, allowing oil to flow from the dump valve on to the main control valves. Keep in mind that the umbilical cord must be connected in order for the remote function to operate.

3 Now, remote control of the crane functions can be operated.

(4) Going back to the input side of circuit breaker No. 1 within the junction box, there is a BLACK jumper wire that goes to the input side of circuit breaker No. 2.

(5) With power supplied there, the BLACK wire on the output side of circuit breaker No. 2 will now send power to terminal No. 1 of terminal block No. 1.

(6) At this point, terminal No. 1 of terminal block No. 1 will supply power to the relay, capacity alert dump valve, and proximity switch.

(a) Terminals 86 and 87 of the relay are powered by terminal block No. 1, implying that battery voltage is present at all times while the ignition switch is in the "ON" position.

(b) Terminal 30 of the relay powers the capacity alert dump valve, while terminal 85 of the relay is controlled by the proximity switch. By this, terminal 30 will maintain battery voltage, unless it is interrupted by terminal 85, causing a circuit change.

(c) Terminal No. 1 of terminal block No. 1 also provides power to the proximity switch through the GREEN wire from the block up to the BROWN wire on the proximity switch.

(d) The pendulum within the proximity switch housing effects the circuit of the proximity switch when contact is made to it, but only during overload and above the horizontal position.

(e) When this occurs, voltage is now applied at terminal 85 of the relay, which changes voltage at terminal 30.

(f) This would, in turn, break the circuit at the capacity alert dump valve, rerouting oil back to the reservoir instead of to the control valve bank.

(g) The folding boom function would cease operating until the reach of the crane is reduced to within its rated load capacity. The relay will, in turn, reset and allow the function of the folding boom to operate normally.

3. INSPECTING THE MK17 ELECTRICAL SYSTEM FOR SERVICEABILITY.

a. Junction Box

(1) Check for loose mounting clamps that hold the junction box to the right slewing cylinder.

(2) Inspect the junction box lid to ensure secureness, and that there is no sign of moisture entry. If moisture entry is suspected, remove the lid and inspect the internal components for damage.

(3) Inspect the outside of the junction box, where the cabling is attached, for proper sealing and that all rubber grommets are in place, or holes are sealed.

b. Circuit Breakers

(1) Inspect the circuit breakers for signs of corrosion and inspect to see that they are secured to the junction box.

(2) Check the wiring going to the circuit breakers for secureness, and that the wiring is properly routed to the circuit breakers.

c. Terminal Blocks

(1) Inspect the terminal blocks for signs of cracks and broken terminals.

(2) Check for signs of corrosion at the terminal posts.

(3) Ensure that all wires going to the terminal blocks are secure, and that the wiring is properly routed to the correct terminal blocks.

d. Relay

(1) Inspect the relay for signs of corrosion and burns.

(2) Ensure that all wires leading to the relay are attached to the appropriate terminal of the relay.

e. Proximity Switch

(1) First, remove the cover to the proximity housing, and check that the pendulum moves freely; lubricate it as necessary.

(2) Next, check the magnetic switch for secureness, and that there is no visible damage.

(3) Check the one-eighth inch clearance between the pendulum and the switch. There should be a gap between the pendulum and switch when the folding boom is at the horizontal position. Adjust the switch as necessary to provide the proper clearance.

(4) Now, check for frayed or broken wiring at the switch.

f. Neutral Switch (Electrical Failure Valve)

(1) Check for tears in the rubber boot that contains the neutral switch, and ensure that the nylon tie strap is secured to the boot.

(2) If there is a suspected electrical problem, remove the boot and ensure that the wires are free of corrosion, fraying, and are securely fastened to the switch by their retaining pins.

4. ORGANIZATIONAL MAINTENANCE RESPONSIBILITIES RELATIVE TO THE MK17 CRANE ELECTRICAL SYSTEM

a. The organizational maintenance mechanic is responsible for inspecting, testing, and replacing the following items:

(1) circuit breakers,

(2) terminal blocks,

(3) relays,

(4) proximity switch,

(5) neutral switch, and

(6) wiring and cabling to the capacity alert dump valve, manual/off/remote switch, neutral switch, and solenoid dump valve.

b. Additionally, the organizational mechanic is also responsible for replacing the junction box.

5. DIAGNOSE MALFUNCTIONS IN THE MK17 CRANE ELECTRICAL SYSTEM. There are basically three malfunctions that can occur with the electrical portion of the crane; the first being "crane inoperative," the second is " the remote control system does not work," and the last is "the capacity alert system does not work." We'll begin with the first, "crane inoperative."

a. Crane Inoperative. Before attempting to go directly to the problem, the technical manual (TM) will tell us to verify the following items:

(1) Make sure the parking brake is applied.

(2) Make sure the transmission is in "NEUTRAL."

(3) Make sure the hydraulic steering system is functioning properly.

(4) Make sure the front power unit electrical system is functioning properly.

(5) Make sure the ignition switch is in the "ON" position.

(6) Make sure the manual/off/remote switch is in the "MANUAL" position.

(7) Ensure that the hydraulic reservoir is full, and that the hydraulic lines, hoses, and fittings are not leaking or damaged.

(8) Ensure that the auxiliary selector valve is pulled out.

(a) Now, if the crane does not operate, attempt to close the electrical failure valve and operate the crane. Crane operation should now be possible. But, we still have the problem of an electrical failure to take care of. Move the electrical failure valve back to the "OPEN" position.

(b) Assuming that there is power up to MC20, we can better isolate the problem. If power was not present, then the technical manual would refer us to the MK16 troubleshooting section to isolate the malfunction.

(c) After verifying voltage at MC20, remove the junction box cover and check for voltage on the input side of circuit breaker (CB) No. 1. If voltage is present, test for voltage at the output side of circuit breaker (CB) No. 1.

(d) Assuming voltage is present on the output side of circuit breaker No. 1, pull the boot back and check for battery voltage on the BLACK wire on the neutral switch at the electrical failure valve. Repair/replace the "BLACK" wire between the neutral switch and the output side of circuit breaker No. 1, if voltage is not found. If voltage is present, check the BROWN wire on the neutral switch for battery voltage. If voltage is not present, replace the neutral switch.

NOTE: Make sure the valve is in the "open" position when performing the test.

(e) If voltage is present, move to where the connectors are located at the solenoid dump valve. Now, unplug both connectors and check the FEMALE connector on the harness side for 24 volts. If voltage is not present, further testing will be required at the intermediate maintenance level. If voltage is present, move to the harness side of the MALE connector and check for continuity to a known good ground. If continuity is found, replace the solenoid dump valve.

(f) If continuity isn't found at the MALE connector on the harness side, proceed with testing for continuity at the MALE connector at the crane wiring harness leading to the actuator box.

(g) If continuity is found, further testing will be required at the intermediate maintenance level. If continuity is not found, leave the

connector disconnected and check for continuity between the MALE connector and terminal No. 3 on terminal block No. 2.

(h) Now, if continuity is not present between these two points, repair/replace the WHITE wire between the MALE connector and terminal No. 6 on terminal block No. 2. If continuity and/or voltage is present up to this point, the possibility of a good ground from MC20 could be the culprit.

(i) Going back to MC20, unplug it and check for continuity between pin B on the chassis side of the harness and ground. If continuity is not found, repair/replace wire 435 between pin B and ground.

(j) If continuity is found at that point, leave MC20 disconnected and check for continuity between pin B on the crane side of MC20 and terminal No. 3 at terminal block No. 2. If continuity is not found, repair/replace the white wire and/or jumper wire between pin B of connector MC20 and terminal No. 3 at terminal block No. 2.

(k) Without a doubt, if continuity is found at this point, and the crane still did not work electrically, then the problem should be referred to the intermediate maintenance level.

(9) Now, if voltage wasn't present at MC20, we would have to trouble- shoot the electrical system back to the MK48 unit. The procedures begin at Test 17, page 2-435 of TM 2320-20/12 volumn 1 of 2.

(a) First, probe wire 844 (pin N) on both sides of MC18 for battery voltage.

1 If 24 volts are present on both sides of MC18, repair/ replace wire 844 between MC18 and MC20.

2 If 24 volts are present on one side only of MC18, clean, repair, or replace MC18 as needed.

3 If 24 volts were not present at MC18, further testing would be required at MC6.

(b) Again, check both sides of wire 844 (pin 8) of MC6 for battery voltage.

1 If 24 volts are present on both sides of MC6, repair/ replace wire 844 between MC6 and MC18.

2 If 24 volts are present on one side only of MC6, clean, repair, or replace MC6 as needed.

3 If 24 volts are not present, go to CB No. 12 and check for voltage.

(c) At the output side of CB No. 12, voltage should be present at wire 844.

1 If 24 volts are present, repair/replace wire 844 between CB No. 12 and MC6.

2 If 24 volts are not present, check the input side of CB No. 12 for voltage.

(d) With the test lead at the input side of CB No. 12, check for 24 volts.

1 If 24 volts are present, but weren't on the output side, replace the circuit breaker.

2 If 24 volts are not present, check the input side of CB No. 11.

(e) Now, with the test lead at the input side of CB No. 11, check for 24 volts.

1 If 24 volts are present on the input side, but weren't at the input side of CB No. 12, replace the bus bar. (Make sure it is there.)

2 If 24 volts are not present, then we would have to check the accessory circuit at the ignition switch. We already have an understanding of testing the ignition switch, so no further evaluation will be required.

(f) If, after all the above tests and/or repairs have been accomplished, the crane is still inoperative, notify intermediate maintenance.

b. Remote Control System Does Not Work. The technical manual will specify that unless called for in the test being done, all electrical tests will be conducted with the ignition switch "ON," the selector valve in the auxiliary (OUT) position, and the crane unstowed.

(1) First, ensure that the manual/off/remote switch is in the "REMOTE" position.

(2) Now check that the electrical failure valve is in the "OPEN" (vertical) position. Keep in mind that if the electrical failure valve is in the "CLOSED" position, you will never get power to the manual/off/remote switch.

(3) At this time, let's perform the remote control bypass test utilizing the test plug (reset tool).

(a) First, remove the test plug from its stowage receptacle by pushing up on the latch.

(b) Next, install the test plug into the cable receptacle and lock it in place with the latch.

(c) Ensure that you do not hold the test button for a prolonged period of time, usually not more than 15 seconds. Damage to the actuator box wiring will result if depressed for longer periods of time.

(d) With an assistant holding the test button, check that all control levers are locked into center (neutral) position. A resistance should be felt and the levers will have little movement. Also, these levers should be in a straight line.

(e) If any lever will not lock or does not line up, adjustment of the internal remote system is required at the intermediate maintenance level. We will learn more of this later in the lesson.

(f) Now, remove the test plug and place it back it its stowage receptacle.

(4) Let's assume, for the moment, that all levers did line up and lock into the neutral position, but the remote controller still does not operate.

(5) Our last test to perform is to connect a known good remote control cable (umbilical cord) to the remote controller and connector.

(a) If the remote control does not operate, further testing into the actuator box assembly is required. Notify intermediate maintenance.

(b) If the remote control now operates, replace the remote control cable.

c. Capacity Alert System Does Not Work. Again, the technical manual will remind us that all electrical tests will be conducted with the ignition switch "ON," selector valve in the auxiliary (OUT) position, and the crane

unstowed. Also, the proximity switch housing (located on the folding boom) must be removed and manually engaged. This is accomplished by holding the pendulum against the proximity switch, ensuring contact is made.

(1) Begin by making sure that the manual/off/remote switch is in the "MANUAL" position, and that the electrical failure valve is in the "OPEN" (vertical) position.

(2) Remove the cover from the junction box, condition your multimeter for voltage, and check for 24 volts on the input side of circuit breaker No. 2. If 24 volts are not present, repair/replace the jumper wire between CB No. 1 and CB No. 2. If 24 volts are present, check for voltage on the output side of CB No. 2.

(3) Now, at the output side of CB No. 2, 24 volts should be present. If not, replace CB No. 2.

(4) Next, check for voltage at terminal No. 1 of terminal block No. 1. If 24 volts are not present, but were at the output side of CB No. 2, repair/replace the wire from the output side of CB No. 2 and terminal No. 1 of terminal block No. 1. If 24 volts are present, move on to the proximity switch.

(5) Remove the insulation approximately six inches from where the proximity switch is mounted, to expose the three wires contained within.

(6) With the multimeter still conditioned to read voltage, check for 24 volts by piercing the test probe into the BROWN/GREEN wire. If voltage is not present, repair/replace the BROWN/GREEN wire from the proximity switch to terminal No. 1 of terminal block No. 1. If voltage is present, move to the BLUE/WHITE wire.

(7) Before testing, condition the multimeter to read continuity and turn the ignition switch to "OFF."

(8) Now, pierce the BLUE/WHITE wire with one test probe and place the other test probe to terminal No. 3 of terminal block No. 2. If an infinity reading is present, repair/replace the WHITE wire from the proximity switch to terminal No. 3 of terminal block No. 2. If continuity is present, we'll continue testing.

(9) Remove the BLACK wire from terminal 85 of the relay. Using one of your meter probes, pierce the insulation at the black wire of the proximity switch and hold the other meter probe at the end of the wire where it was removed. If no continuity is found, repair/replace the BLACK wire.

If continuity is found, reconnect the wire at terminal 85 and continue testing, but condition the multimeter to read voltage.

(10) Using a jumper wire, connect one end to terminal 85 of the relay and the other end to terminal No. 3 of terminal block No. 2. Now, remove the BLACK wire from terminal 30 of the relay, turn the ignition switch "ON," and check for 24 volts on terminal 30. If 24 volts are present, replace the proximity switch. If not, remove the jumper wire, reconnect the BLACK wire to terminal 30, and continue testing.

(11) Remove the BLACK wire from terminal 86 of the relay and check for 24 volts. If 24 volts are not present, repair/replace the BLACK wire between terminal 86 of the relay and terminal No. 1 of terminal block No. 1. If 24 volts are present, reconnect the BLACK wire to terminal 86 of the relay and continue testing.

(12) Now, remove the BLACK wire from terminal 87 of the relay and, again, check for 24 volts on the wire. If 24 volts are not present, repair/replace the BLACK wire between terminal 87 of the relay and terminal No. 1 of terminal block No. 1. If 24 volts are present, reconnect the BLACK wire to terminal 87 of the relay and continue testing.

(13) Remove the BLACK wire from terminal 85 of the relay. Using a jumper wire, connect terminal 85 to terminal No. 3 of terminal block No. 2. Remove the BLACK wire from terminal 30 of the relay and check for 24 volts on terminal 30 of the relay. If 24 volts are not present, replace the relay. If 24 volts are present, continue testing.

(14) Disconnect the connector at the capacity alert dump valve and check for 24 volts on pin A of the harness connector. If 24 volts are not present, repair/replace the BLACK wire between terminal 30 of the relay and pin A. If 24 volts are present, perform the last test to determine if intermediate maintenance should be notified.

(15) With the connector at the capacity alert dump valve still disconnected, check for continuity between terminal No. 6 of terminal block No. 2 and pin B of the harness connector. If continuity is not present, repair/replace the WHITE wire between terminal No. 6 of terminal block No. 2 and pin B. If continuity is present, the capacity alert dump valve is defective. Notify intermediate maintenance.

6. INTERMEDIATE MAINTENANCE RESPONSIBILITIES RELATIVE TO THE MK17 CRANE ELECTRICAL SYSTEM

a. Remote Control Unit Testing and Adjustment. If, during the testing of the crane with the test plug (reset tool), you found that the control

levers did not line up or that the actuator rods were overstroked, it would be the responsibility of intermediate maintenance to test and/or adjust the remote controller and actuator assembly.

(1) Testing procedures

(a) To test for proper drive fork alignment, the following procedures apply.

1 First, install the remote control unit as prescribed in TM 2320-10/11, operator's manual.

2 Now, remove the two Allen head capscrews, the rubber "O" rings and washer assemblies, and the cover from the actuator box assembly. Do not use a sharp instrument to pry the cover off. If it is stuck, use a wooden block or rubber mallet to aid in the removal.

3 Turn the ignition switch to the "ON" position. The vehicle does not have to be running for this test.

4 With an assistant, hold in a deadman switch on the remote control unit.

5 Check that each drive fork is centered (neutral position) on the RED dot by observing the centerline of the drive fork. All drive forks must be centered before any other tests or adjustments can be made. If the drive forks are not centered, adjustment is required. If all drive forks are centered, check for proper adjustment of the upstroke and downstroke of the crane control levers.

6 Damage to equipment could occur if the crane control levers are overstroked in either direction.

(b) To test for proper upstroke and downstroke positions, the following procedures apply:

1 Remove the clip pins and clevis pins from the crane control levers.

2 Have an assistant operate the remote control unit and place the control lever in the full upstroke position and hold. Make sure that the actuator rod is locked in by moving it up and down.

3 Now, manually move the crane control lever up to aline the hole in the crane control lever with the hole in the clevis. These holes must line up. If not, adjustment is required.

4 The same procedures will also apply for the adjustment of the downstroke position.

(2) Adjustment procedures

(a) The first adjustment is to align the drive fork centerline.

1 You must first remove four screws from the cover of the remote control unit and turn the cover upside down.

2 Now, have an assistant hold in the deadman switch on the remote control unit.

3 Adjust the remote control unit potentiometer screw in or out to aline the drive fork centerline with the red dot on the motor mount bar.

4 Loosen the locknut on the crane control lever and rotate the clevis in or out until it is aligned with the hole in the crane control lever.

5 Tighten the locknut and repeat the above steps as required for the remaining control levers.

(b) To make an adjustment to either the upstroke or downstroke position:

1 Have an assistant hold the deadman switch in and operate the remote control unit by placing the remote controller lever in the full upstroke position and hold. Make sure that the actuator rod is locked in.

2 Manually move the crane control lever up fully, then back off one-eighth of an inch. Do not disturb this position.

3 Now, loosen the locknut on the adjusting screw of the remote control and turn the adjusting screw in or out to aline the hole in the clevis with the hole in the crane control lever.

4 Once the adjustment is made, tighten the locknut on the adjustment screw and repeat the above steps as required for the remaining crane control levers.

5 Adjustment for the downstroke position is accomplished in the same manner as the upstroke.

(3) After testing and/or adjustment is made:

(a) Install the clevis pins and clip pins.

(b) Install the cover on the remote control unit and secure it with the four screws. Tighten them securely.

(c) Disconnect the remote control unit and stow it in the stowage compartment.

(d) Install the cover of the actuator assembly, along with two rubber "O" rings and washer assemblies, and the Allen head capscrews. Tighten the capscrews to the torque specifications described in your technical manual.

REFERENCE:

TM 2320-20/12A